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probability of this kind of failure is extremely remote.

(3) Each system must have means to prevent the engine from producing more than idle thrust when the reversing system malfunctions, except that it may produce any greater forward thrust that is shown to allow directional control to be maintained, with aerodynamic means alone, under the most critical reversing condition expected in operation.

(b) For propeller reversing systems—

(1) Each system intended for ground operation only must be designed so that no single failure (or reasonably likely combination of failures) or malfunction of the system will result in unwanted reverse thrust under any expected operating condition. Failure of structural elements need not be considered if this kind of failure is extremely remote.

(2) Compliance with this section may be shown by failure analysis or testing, or both, for propeller systems that allow propeller blades to move from the flight low-pitch position to a position that is substantially less than that at the normal flight low-pitch position. The analysis may include or be supported by the analysis made to show compliance with the requirements of §35.21 of this chapter for the propeller and associated installation components.

[Amdt. 25-72, 55 FR 29784, July 20, 1990]

§ 25.934 Turbojet engine thrust reverser system tests.

Thrust reversers installed on turbojet engines must meet the requirements of §33.97 of this chapter.

[Amdt. 25-23, 35 FR 5677, Apr. 8, 1970]

§ 25.937 Turbopropeller-drag limiting systems.

Turbopropeller power airplane propeller-drag limiting systems must be designed so that no single failure or malfunction of any of the systems during normal or emergency operation results in propeller drag in excess of that for which the airplane was designed under §25.367. Failure of structural elements of the drag limiting systems need not be considered if the prob-

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ability of this kind of failure is extremely remote.

§ 25.939 Turbine engine operating characteristics.

(a) Turbine engine operating characteristics must be investigated in flight to determine that no adverse characteristics (such as stall, surge, or flameout) are present, to a hazardous degree, during normal and emergency operation within the range of operating limitations of the airplane and of the engine.

(b) [Reserved]

(c) The turbine engine air inlet system may not, as a result of air flow distortion during normal operation, cause vibration harmful to the engine.

[Amdt. 25-11, 32 FR 6912, May 5, 1967, as amended by Amdt. 25-40, 42 FR 15043, Mar. 17, 1977]

§ 25.941 Inlet, engine, and exhaust compatibility.

For airplanes using variable inlet or exhaust system geometry, or both—

(a) The system comprised of the inlet, engine (including thrust augmentation systems, if incorporated), and exhaust must be shown to function properly under all operating conditions for which approval is sought, including all engine rotating speeds and power settings, and engine inlet and exhaust configurations;

(b) The dynamic effects of the operation of these (including consideration of probable malfunctions) upon the aerodynamic control of the airplane may not result in any condition that would require exceptional skill, alertness, or strength on the part of the pilot to avoid exceeding an operational or structural limitation of the airplane; and

(c) In showing compliance with paragraph (b) of this section, the pilot strength required may not exceed the limits set forth in §25.143(c), subject to the conditions set forth in paragraphs (d) and (e) of §25.143.

[Amdt. 25-38, 41 FR 55467, Dec. 20, 1976]

§ 25.943 Negative acceleration.

No hazardous malfunction of an engine, an auxiliary power unit approved for use in flight, or any component or

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system associated with the powerplant or auxiliary power unit may occur when the airplane is operated at the negative accelerations within the flight envelopes prescribed in §25.333. This must be shown for the greatest duration expected for the acceleration.

[Amdt. 25-40, 42 FR 15043, Mar. 17, 1977]

§ 25.945 Thrust or power augmentation system.

(a) *General.* Each fluid injection system must provide a flow of fluid at the rate and pressure established for proper engine functioning under each intended operating condition. If the fluid can freeze, fluid freezing may not damage the airplane or adversely affect airplane performance.

(b) *Fluid tanks.* Each augmentation system fluid tank must meet the following requirements:

(1) Each tank must be able to withstand without failure the vibration, inertia, fluid, and structural loads that it may be subject to in operation.

(2) The tanks as mounted in the airplane must be able to withstand without failure or leakage an internal pressure 1.5 times the maximum operating pressure.

(3) If a vent is provided, the venting must be effective under all normal flight conditions.

(4) [Reserved]

(c) Augmentation system drains must be designed and located in accordance with §25.1455 if—

(1) The augmentation system fluid is subject to freezing; and

(2) The fluid may be drained in flight or during ground operation.

(d) The augmentation liquid tank capacity available for the use of each engine must be large enough to allow operation of the airplane under the approved procedures for the use of liquid-augmented power. The computation of liquid consumption must be based on the maximum approved rate appropriate for the desired engine output and must include the effect of temperature on engine performance as well as any other factors that might vary the amount of liquid required.

(e) This section does not apply to fuel injection systems.

[Amdt. 25-40, 42 FR 15043, Mar. 17, 1977, as amended by Amdt. 25-72, 55 FR 29785, July 20, 1990]

FUEL SYSTEM

§ 25.951 General.

(a) Each fuel system must be constructed and arranged to ensure a flow of fuel at a rate and pressure established for proper engine and auxiliary power unit functioning under each likely operating condition, including any maneuver for which certification is requested and during which the engine or auxiliary power unit is permitted to be in operation.

(b) Each fuel system must be arranged so that any air which is introduced into the system will not result in—

(1) Power interruption for more than 20 seconds for reciprocating engines; or

(2) Flameout for turbine engines.

(c) Each fuel system for a turbine engine must be capable of sustained operation throughout its flow and pressure range with fuel initially saturated with water at 80° F and having 0.75cc of free water per gallon added and cooled to the most critical condition for icing likely to be encountered in operation.

(d) Each fuel system for a turbine engine powered airplane must meet the applicable fuel venting requirements of part 34 of this chapter.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-23, 35 FR 5677, Apr. 8, 1970; Amdt. 25-36, 39 FR 35460, Oct. 1, 1974; Amdt. 25-38, 41 FR 55467, Dec. 20, 1976; Amdt. 25-73, 55 FR 32861, Aug. 10, 1990]

§ 25.952 Fuel system analysis and test.

(a) Proper fuel system functioning under all probable operating conditions must be shown by analysis and those tests found necessary by the Administrator. Tests, if required, must be made using the airplane fuel system or a test article that reproduces the operating characteristics of the portion of the fuel system to be tested.

(b) The likely failure of any heat exchanger using fuel as one of its fluids may not result in a hazardous condition.

[Amdt. 25-40, 42 FR 15043, Mar. 17, 1977]